Resource Management

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Resource Ramblings

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Wind Cave National Park Resource Management News Briefs

This Issue Edited by Dan Roddy, Biologist and Barbara Muenchau, Biological Science Technician





Winter is a great time to explore Wind Cave National Park!

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- The opinions found within the articles are the opinions of the person that submitted the article and not necessarily the opinions held by park management.

Bobcats in Wind Cave National Park

By Cory Mosby, 02/02/09
SDSU Graduate Student

Through collaboration between South Dakota State University, South Dakota Game, Fish, and Parks, and the National Park Service, Wind Cave National Park and the surrounding southern Black Hills has been chosen as one of three field sites to research bobcats. The goals of this project are to determine habitat selection on multiple scales, determine what possible diseases bobcats could serve as a vector to other animals, specifically the black-footed ferret, and to determine population estimates of bobcats throughout the state of South Dakota.

Cory Mosby and his "double catch". Both bobcats were collared

Between October 2007 and May 2008 a total of sixteen cats were collared in the Black Hills, with six of them living in Wind Cave National Park. These bobcats were fitted with Lotek 3300 GPS collars that record 8 locations a day for a year and blood was drawn from each animal. With collars function properly between 2500 and 3000 locations can be expected per individual. When the collars were retrieved this fall home range estimates for Black Hills bobcats was 24 mi^2 for males and 8 mi^2 for females.

With the collar data recorded, the habitat sampling portion of the project is scheduled to begin May 2009 and continue into August 2009.

This is some of the most detailed spatial use information ever gathered on the species and will be very useful in determining their habitat selection and population estimates. Specifically for Wind Cave, park managers will now have an accurate estimate of how many bobcats depend on the park. They will also have a detailed description of how bobcats use the different habitats found within the Park. As for diseases, it is believed that bobcats, with their large home ranges, could serve as vectors of certain diseases, some of which could be harmful to the newly reintroduced black-footed ferret. Therefore in addition to the gain of general knowledge of wildlife in the park, managers will now be better able to make informed decisions concerning their park and this interesting, elusive predator.

Wind Cave National Park Precipitation

By Barbara Muenchau, Biological Science Technician

Wind Cave National Park staff members have been collecting precipitation data since rain gauges were first installed in 1940. Precipitation was documented on a monthly basis from 1940 to 1946, then only sporadically from 1947 to August, 1951. Since then, continuous monthly precipitation data has been recorded, giving us fifty-seven years of information.

As would be expected in the Great Plains, the majority of our precipitation falls from April to September, with the greatest amount being received in May. Figure one represents the 57 year monthly precipitation averages received in the Park. The least amount of precipitation is received in January.

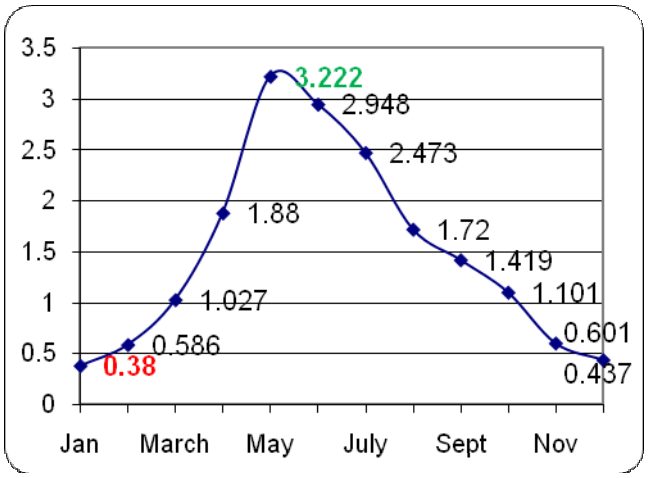

Fig. 1 57 year monthly precipitation averages (1952-2008)

As can be seen in Figure two, Wind Cave annual precipitation can fluctuate greatly as is typical in the Great Plains. In the last 57 years, precipitation has ranged from a low of 10.02″ in 1960, to a high of 28.87″ in 1998. The Park 57 year overall average is 17.79 inches.

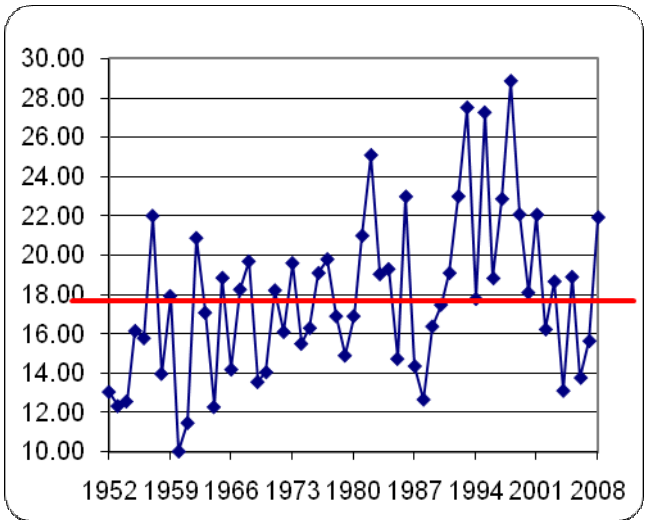

Fig. 2 1952-2008 annual precipitation (**Average = 17.79**)

The Park also has extensive monthly temperature data. Resource Management staff is in the process of compiling this information. Please contact Barbara Muenchau for additional information.

Prairie dogs - A key wildlife species:

By Dan Roddy, Biologist

No matter what I say and do or what arguments I might make, I realize I will not change anyone's mind towards believing prairie dogs have a place in this world. I understand they often times convert grasslands to annual forbs (including non-native species), their activities can create bare ground and at times these areas may become more vulnerable to wind events and erosion. The prairie dogtowns also appear unsightly/ravaged to some people and the prairie dogs themselves are considered destructive and pests by others.

Maybe folks should look at it from a different angle such as the value of prairie dogs to other wildlife species within Wind Cave National Park. Without the prairie dogs and the habitat they create, badgers, burrowing owls, tiger salamanders, prairie rattlesnakes and the federally endangered black-footed ferret would either be rarities or non-existent in this National Park.

I know I'll continue to get nasty phone calls from the neighbors, made fun of by park staff and misunderstood by county, state and retired NPS officials but that's ok. Prairie dogs are an intricate part of the mixed grass prairie along with other disturbance factors such as fire, bison grazing and weather events. They need to be part of the ecological processes within Wind Cave National Park. Currently (March 2009) the park maintains approximately 2,800 acres out of 28,000 acres for use by prairie dogs.

Keep in mind the following:

"While we may personally prefer a valley of lush prairie grass to a prairie dog colony, we cannot with ecological sensitivity refer to one as 'beautiful' and the other as 'ravaged'."

Excerpts from an April 1, 1964 Memorandum from Acting Regional Director to Superintendent, Wind Cave NP

AN INCREASE IN PREVALENCE RATE AND MORE CWD POSITIVES?

By Duane Weber, Biological Science Technician

CWD positive Elk found along Beaver Creek west of High Bridge

The Park began testing for the fatal neurologic condition, Chronic Wasting Disease (CWD) in March of 1998. With over ten years of searching and monitoring for the presence of the disease, are we seeing an increase in the prevalence of CWD within the deer and elk that use the park?
May be, …maybe not.

As of March 15, 2009 we have the test results from 31 White-tailed deer with 1 positive, 110 Mule deer with 7 positive and 68 Elk with19 positive, for a total of 209 animals tested and 27 positives.

In calendar year 2007 we had 1 positive elk. In 2008 we had 7 positive elk. So far this year, 3 positive elk have been documented in the Park

We try and take advantage of every opportunity to collect a sample from deer or elk that have died from whatever the cause. Samples have been collected from road-kills, Mountain lion kills, animals found dead of unknown cause, animals shot under suspicion of the disease, fence entanglements, wildlife capture deaths, radio collar mortalities, etc. Samples are submitted to the Colorado State University Veterinary Diagnostic Laboratory in Fort Collins, Colorado.

We have seen an increase in the number of positive animals in the past few years, but we are also submitting more samples since we have a full time designated employee who covers 300-400 miles per year on foot in the back country. Radio collars on 40-50 elk each year since January 2005 have also helped locate mortalities that may not have been found without the collars.

Another explanation may be that we are still seeing the results of drought conditions from almost two years ago. Since CWD takes at least 17 months from infection to clinical signs of the disease there is a notable lag between infection and death. Two years ago we were critically dry and had been for some time. The lack of water and good forage may well have concentrated animals into the few small areas where their needs were being met. Higher densities of animals make it easier for the disease to spread through saliva, feces, urine, and carcasses.

The only way to accurately determine the prevalence of CWD is to have a large enough RANDOM sample of the deer and elk population. In the Park, the samples collected are from the elk that are either sick or found dead. So 27 positive animals out of 209 is NOT a prevalence rate.

An increase in the prevalence of CWD in the Park Maybe,…maybe not. We just can't answer that question with the manner in which our animals are collected for testing.

AUTONOMOUS RECORDING UNITS (ARU's) SET UP IN PARK

By Barb Muenchau, Biological Science Technician

ARU's have been set up in Beaver Creek and Cold Brook Canyon to verify the presence (by recording of vocalizations) and breeding status of the northern leopard frog, northern saw whet owl and, possibly, the flammulated owl. See Barbara Muenchau for additional information.

Assisting native plants in Wind Cave National Park competing with an invasive species: the stakes are high for ecosystems and all inhabitants

By Marie Curtin (Wind Cave NP), Amy Symstad (USGS) and Beth Burkhart (Wind Cave NP)

***Marrubium vulgare*, white horehound**

The occurrence of white horehound (*Marrubium vulgare* L.), an exotic perennial forb, increased dramatically at Wind Cave National Park during the years 2004-2007. Black-tailed prairie dog towns experienced the greatest increase, probably due to combined effects of drought, intense wildlife grazing and the substantial ground disturbance that occurs in dog towns.

Natural History

White horehound, a member of the mint (Lamiaceae) family, is a native of Europe that was probably introduced into the United States as a garden herb. It escaped cultivation and has become widely distributed along roadsides, dry waste areas, and in gardens. It is an erect perennial, 30-90 cm tall. Stems are somewhat woody at the base, and stems and leaves are covered with a woolly pubescence. Flowers are born in dense clusters in leaf axils. The calyx of each flower surrounds the fruit and develops a whorl of small hooked spines, forming a characteristic cluster of bur-like structures in each leaf axil (Whitson 2001).

These burs catch on fur and clothing and aid in the plant's dispersal. Due to horehound's bitter taste, grazing animals preferentially feed on surrounding plants, thereby reducing palatable competitive species and aiding in horehound's establishment and persistence (Weiss et al. 2000).

During 2006, more than 100 acres of horehound were mapped within the Bison Flats dog town. Additional unmapped acreages are known to exist within this and several other prairie dog towns in the park. Prairie dogs seem to avoid these areas of dense horehound infestations. Thus, prairie dogs may be forced to move from horehound-infested areas to previously unoccupied areas, which causes concern about spread by prairie dogs to

new areas of the park. Observations suggest that white horehound is becoming more abundant outside of prairie dog towns as well as within. Decreasing acres of native plant communities in the park may eventually impact the park's ability to support valued wildlife, including the endangered black-footed ferret.

Control Measures

The extent and density of white horehound that occurs at Wind Cave NP seems to be unique in the region, as other land managers have not observed it to be a problem. Consequently, little information on its control in the northern Great Plains, or even in the United States, exists. Park staff tried various control techniques with little success so far.

Horehound's extensive fibrous root system makes the plant difficult to damage via hand-pulling, and initial attempts at control via this method at the park have yielded negligible effects. Tractor mowing of some horehound occurred in 2005 during Canada thistle control measures, and did not result in any apparent decrease in either the number of horehound plants or the extent of horehound infestations. This is not surprising, given that cultivated crops of this plant (in Europe) can be cut two or three times each year (Simon et al. 1984). Control of bee pollinators has the potential to reduce the amount of seed produced by the species, but this would also impact pollination of native species. Biological control agents that attack vegetative parts of horehound (*Wheeleria spilodactylus* Curtis, the horehound plume moth, and *Chamaesphecia mysiniformis* Rambur, the horehound clearwing moth) have been approved for release in some countries and have proven effective in some instances (Weiss et al. 2000), but they are not approved in the United States.

Several herbicides have been shown to be effective against horehound, including 2,4-5 ester, bromacil, dicamba, MCPA dimethylamine salt and triclopyr.

Control of horehound with broadcast spraying of herbicides is not feasible in some areas of the Park due to cave watershed concerns, and the potential for off-target damage to native plants.

Herbicide	Leachability Potential	Runoff Potential	Detected in Groundwater	Horehound Specific?
2, 4-D ester	small	medium	yes	no
bromacil	large	medium	yes	no
dicamba	large	small	yes	no
MCPA dimethylamine salt	large	small	?	no
triclopyr	medium	large	?	no

Due to these constraints, the most promising method for controlling horehound at Wind Cave National Park is the application of prescribed fire, which has shown good results in controlling horehound plants and reducing the horehound seed bank. A literature review of fire effects on weeds in Australia, where horehound is a major problem, reported 100% mortality for horehound (Downey 1999). Results from a three-year research project accomplished at Wyperfeld National Park in Victoria, Australia, indicate that a spring prescribed fire and reduction in grazing pressure (from kangaroos and rabbits), can kill mature horehound plants and reduce the seed bank by 75%. An additional beneficial effect of the treatments was the tripling in the endemic species abundance in the burnt and ungrazed plots. A reduction in grazing pressure enabled more competition with emerging seedlings, and hence less horehound recruitment (Weiss and Wills, 2000). Reduction in grazing would be impossible to achieve at Wind Cave NP due to the costs involved in erecting ungulate- and prairie dog-proof exclosures.

Application of broadcast prescribed fire can be difficult to accomplish within prairie dog towns because they often lack sufficient ground fuels to carry a fire. To overcome this difficulty, the Park decided to test a weed flamer. This tool is essentially a linear array of propane torches directed downward. The array is fixed on a trailer with a propane tank, which is pulled over the treatment area behind an all-terrain vehicle. Because liquid propane is the major source of fuel for the flame, this tool can deliver fire directly to plants in a prairie dog town with little carrying fuel and/or under conditions in which a broadcast fire would not carry (e.g., high fuel moisture or air humidity, low winds). The flamer also allows greater control over burn conditions such as rate of spread and intensity, both of which can influence the effectiveness and effects of a prescribed burn (e.g., Kerns et al. 2006). The time of the burn with respect to the growth of the vegetation can also have significant effects on the target species and other vegetation (Willson and Stubbendieck 1997, Engle et al. 1998, Howe 2000).

Another potential advantage of the weed flamer is a logistics advantage. Fire crews are typically very busy applying broadcast prescribed fires very early in the growing season and after senescence, and they are often involved in controlling unintentional fires late in the growing season. It is hoped that the ability to deliver a flame application to horehound at different times of the year will provide flexibility for prioritizing this activity with respect to others of the fire crew.

To measure effectiveness of the flamer against horehound, twenty-eight study plots were established in four prairie dog towns. These plots were also designed to provide information regarding which species occurred once horehound was reduced or removed. The first test of the flamer was accomplished during July and August of 2008, with seven plots flamed. Seven plots were scheduled for burn during the winter of 2009, and seven for burn in spring 2009. The remaining seven were intended as study control plots.

Initial implementation of the flamer treatment in the summer 2008 test of the flamer was much more expensive than anticipated due to the high cost of liquid propane. In addition, it was more time-consuming than expected because in the summer, the flamer needed to travel fairly slowly to have an effect on the lush green vegetation (2008 precipitation was four inches above average and resulted in greater canopy coverage within horehound infestations). As a result, the park has decided to consider other alternatives for delivering fire within horehound infestations.

In 2009, Wind Cave NP resource management and Northern Great Plains Fire staff collaborated to revise the initial study that was designed to examine results of the flamer alone. The high moisture year in 2008 boosted growth of white horehound so infestations that were deemed not able to carry a broadcast fire in 2007 now have dense, overlapping canopies of horehound plants. Planning is currently underway to add treatments to the original study design to study not only the results of the flamer at different stages of horehound growth but also to determine the effectiveness of reducing horehound by broadcast burning, mowing (mowing off tops of plants, to create a ground level fuel layer) followed by broadcast burning, and herbicide treatment (in areas outside the herbicide-free zone of the park designated to protect cave/hydrology resources).

Even if Wind Cave NP is successful at pushing white horehound into the vegetation as a background species, a major concern is: what new

non-native, invasive species is lurking out there to take its place? It's believed that horehound came into the niche vacated when Canada thistle (*Cirsium arvense*) was controlled in disturbed areas. The lessons seem to be, firstly, that more thought should be focused on determining what desired future conditions for native plant species/communities are in areas that experience ongoing disturbance from agents such as prairie dogs. Secondly, more action may be needed to assist or direct the path that vegetation rehabilitation follows (such as seeding or planting plugs of desired native species) when invasive species are removed.

Stay tuned for the results of this work in future Resource Ramblings, or check it out by taking hikes in the park over the next year and making your own observations! Results may not occur quickly, but steady and long-term are better than fast. The risks related to not achieving success in supporting native plants/communities are very high to the ecosystems of Wind Cave NP and the life they support (from insects to reptiles, amphibians, birds, and mammals).

Literature Cited

Downey, P. O. 1999. Fire and weeds: a management option or Pandora's box? Australian Bushfire Conference. School of Environmental and Information Sciences and Johnstone Center, Charles Sturt University, Albury, NSW. http://www.csu.edu.au/special/bushfire99/papers/downey/

Engle, D. M., R. L. Mitchell, and R. L. Stevens. 1998. Late growing-season fire effects in mid-successional tallgrass prairies. Journal of Range Management 51:115-121.

Howe, H. F. 2000. Grass response to seasonal burns in experimental plantings. Journal of Range Management 53:437-441.

Kerns, B. K., W. G. Thies, and C. G. Niwa. 2006. Season and severity of prescribed burn in ponderosa pine forests: Implications for understory native and exotic plants. Ecoscience 13:44-55.

Simon, J.E., A.F. Chadwick, and L.E. Craker. 1984. Herbs: An Indexed Bibliography. 1971-1980. The Scientific Literature on Selected Herbs, and Aromatic and Medicinal Plants of the Temperate Zone. Archon Books, 770 pp., Hamden, CT., as cited by the New Crop Resource Online Program, Purdue University (http://www.hort.purdue.edu/newcrop/nexus/Marrubium_vulgare_nex.html). Accessed 9 January 2007.

Weiss, J., N. Ainsworth, and I. Faithful. 2000. Best Practice Management Guide, Horehound, *Marrubium vulgare*. Cooperative Research Centre for Weed Management Systems (Weeds CRC) at University of Adelaide, PMB1 Glen Osmond, South Australia, Australia 5064. http://www.weeds.crc.org.au/documents/horehound.pdf

Weiss, J. and E. Wills. 2000. Integrated management of horehound (*Marrubium vulgare* L.) in Wyperfeld National Park. Plant Protection Quarterly 15:40-42.

Whitson, T. D., L. C. Burrill, S. A. Dewey, D. W. Cudney, B. E. Nelson, R. D. Lee, and R. Parker. 2001. Weeds of the West. 9th edition. Western Society of Weed Science, Newark, CA.

Willson, G. D., and J. Stubbendieck. 1997. Fire effects on four growth stages of smooth brome (*Bromus inermis* Leyss.). Natural Areas Journal 17:306-312.